The Effect of Sarcopenia on Reverse Total Shoulder Arthroplasty Outcomes: A Matched Cohort Study

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INTRODUCTION: Sarcopenia is increasingly recognized as a risk factor for complications following total joint arthroplasty, raising particular concern in the aging population. Studies have demonstrated that sarcopenia worsens outcomes after total shoulder arthroplasty, including a higher risk of instability, nerve injury, hospital readmission, and increased healthcare costs. However, its impact on reverse total shoulder arthroplasty (rTSA) remains unclear and insufficiently studied. This study aims to evaluate postoperative outcomes of rTSA in sarcopenic versus non-sarcopenic patients.

METHODS: Data were retrospectively collected and analyzed using the TriNetX Research Network. Patients diagnosed with sarcopenia were identified through ICD-10 and CPT codes and were included if they subsequently underwent reverse total shoulder arthroplasty (rTSA). A 1:1 propensity score match was performed with rTSA patients without sarcopenia, adjusting for age, body mass index (BMI), sex, diabetes mellitus, chronic kidney disease, osteoporosis, heart failure, tobacco use, chronic obstructive pulmonary disease, prior myocardial infarction, hepatic fibrosis, unspecified dementia, cerebrovascular disease, and generalized atherosclerosis. Postoperative outcomes were assessed at 3 and 6 months, as well as at 1 and 2 years.

RESULTS: An initial query identified 24,231 patients who underwent reverse total shoulder arthroplasty (rTSA). Among these, 1,497 patients were sarcopenic and 22,734 were non-sarcopenic. After 1:1 propensity score matching, each cohort included 1,491 patients.
At 3 months postoperatively, the sarcopenic rTSA group demonstrated significantly higher odds of surgical complications (OR: 2.22, $p = 0.03$ at 3 months; OR: 1.87, $p = 0.06$ at 6 months) and pain (OR: 2.22, $p < 0.001$ at 3 months; OR: 2.34, $p < 0.001$ at 6 months), as well as prosthetic joint infection (OR: –, $p = 0.02$ at 3 months), postoperative blood transfusion (OR: 2.10, $p = 0.03$ at 3 months), and readmission (OR: 1.68, $p < 0.001$ at 3 months; OR: 1.65, $p < 0.001$ at 6 months) (Table 1). By 12 months, the sarcopenic group also showed significantly higher odds of revision (OR: 1.25, $p = 0.04$ at 12 months) and postoperative opioid abuse/dependence (OR: 2.46, $p = 0.004$ at 12 months; OR: 1.66, $p = 0.03$ at 24 months) (Table 2).

DISCUSSION: Sarcopenia is a significant risk factor for complications following reverse total shoulder arthroplasty. Sarcopenic patients demonstrated higher rates of surgical complications, pain, prosthetic joint infection, postoperative blood transfusion, and readmission, as well as long term complications and higher odds of revision, and postoperative opioid abuse. Given that sarcopenia is a treatable entity and may be a very relevant modifiable risk factor, early postoperative identification and targeted postoperative interventions may help to improve postoperative outcomes

SIGNIFICANCE/CLINICAL RELEVANCE: These findings suggest that sarcopenia is an important patient-specific risk factor following rTSA. Sarcopenic patients experienced higher odds of early surgical complications, pain, prosthetic joint infection, blood transfusion, and readmission, as well as increased long-term risk of revision surgery and postoperative opioid dependence. While rTSA remains a viable treatment option, these results underscore the importance of preoperative identification of sarcopenia, careful perioperative planning, and closer postoperative monitoring. Surgeons should incorporate sarcopenia assessment into risk stratification and shared decision-making to optimize outcomes and tailor postoperative care for this high-risk population.

Table 1: Comparison of Surgical Complication Rates Between Sarcopenic and Control Cohorts at 3 and 6 months.

	3 Months				6 Months			
	Control rTSA (N=1,491)	Sarcopenia rTSA (N=1,491)	OR (95% CI)	P-value	Control rTSA (N=1,491)	Sarcopenia rTSA (N=1,491)	OR (95% CI)	P-value
Postop Infection, n(%)	10 (0.01%)	10 (0.01%)	1.00 (0.42 - 2.41)	1.00	10 (0.01%)	10 (0.01%)	1.00 (0.42 - 2.41)	1.00
PJI, n(%)	10 (0.01%)	0 (0%)	-	**0.002**	10 (0.01%)	10 (0.01%)	1.00 (0.42 - 2.41)	1.00
Prosthetic Complications, n(%)	44 (0.03%)	49 (0.03%)	1.12 (0.74 - 1.69)	0.60	57 (0.04%)	60 (0.04%)	1.06 (0.73 - 1.53)	0.78
Prosthetic Dislocation, n(%)	30 (0.02%)	36 (0.02%)	1.21 (0.74-1.97)	0.46	37 (0.03%)	43 (0.3%)	1.17 (0.75 - 1.82)	0.50
Mechanical Loosening, n(%)	10 (0.01%)	10 (0.01%)	1.00 (0.42 - 2.41)	1.00	10 (0.01%)	10 (0.01%)	1.00 (0.42 - 2.41)	1.00
Implant Fracture, n(%)	10 (0.01%)	10 (0.01%)	1.00 (0.42 - 2.41)	1.00	10 (0.01%)	10 (0.01%)	1.00 (0.42 - 2.41)	1.00
Periprosthetic Fracture, n(%)	10 (0.01%)	11 (0.01%)	1.10 (0.47 - 2.60)	0.83	14 (0.01%)	12 (0.01%)	0.86 (0.40 - 1.86)	0.69
Wound Complications, n(%)	10 (0.01%)	20 (0.01%)	2.01 (0.94 -4.32)	0.07	10 (0.01%)	22 (0.02%)	2.22 (1.05 - 4.70)	**0.03**
DVT, n(%)	10 (0.01%)	10 (0.01%)	1.00 (0.42 - 2.41)	1.00	11 (0.01%)	10 (0.01%)	0.91 (0.39- 2.15)	0.83
Post-op Blood Transfusion, n(%)	12 (0.01%)	25 (0.02%)	2.10 (1.05 - 4.20)	**0.03**	16 (0.01%)	28 (0.02%)	1.76 (0.95 - 3.28)	0.07
Revision, n(%)	25 (0.02%)	29 (0.02%)	1.16 (0.68 - 2.00)	0.58	32 (0.02%)	39 (0.02%)	1.23 (0.76- 1.97)	0.40
Mortality, n(%)	10 (0.01%)	10 (0.01%)	1.00 (0.42 - 2.41)	1.00	10 (0.01%)	10 (0.01%)	1.00 (0.42 - 2.41)	1.00
Surgical Complications, n(%)	10 (0.01%)	22 (0.02%)	2.22 (1.05 - 4.70)	**0.03**	14 (0.01%)	26 (0.02%)	1.87 (0.97- 3.60)	**0.06**
Pain, n(%)	633 (0.43%)	926 (0.62%)	2.22 (1.92 - 2.57)	**<0.001**	719 (0.48%)	1,022 (0.69%)	2.34 (2.02- 2.72)	**<0.001**
Opioid Use, n (%)	1,316 (0.88%)	1,329 (0.89%)	1.09 (0.87-1.36)	0.46	1,302 (0.87%)	1,338 (0.90%)	1.27 (1.01 - 1.59)	**0.04**
Postop Diagnosis Opioid Abuse/Dependence, n(%)	10 (0.01%)	13 (0.01%)	1.303 (0.57 - 2.98)	0.53	10 (0.01%)	20 (0.01%)	2.01 (0.94 - 4.32)	0.07
Readmissions n(%)	402 (0.27%)	570 (0.38%)	1.68 (1.44- 1.96%)	**<0.001**	420 (0.28%)	585 (0.39%)	1.65 (1.41 - 1.92)	**<0.001**
ER Visits, n(%)	127 (0.09%)	155 (0.10%)	1.25 (0.97 - 1.59)	0.08	181 (0.12%)	213 (0.14%)	1.21 (0.98 - 1.49)	0.08

Table 2: Long-Term Surgical Outcomes in Sarcopenic vs. Control Patients at 1-Year and 2 Years

	12 Months				2 Years			
	Control rTSA (N=1,491)	Sarcopenia rTSA (N=1,491)	OR (95% CI)	P-value	Control rTSA (N=1,491)	Sarcopenia rTSA (N=1,491)	OR (95% CI)	P-value
Prosthetic Complications, n(%)	68 (0.05%)	74 (0.05%)	1.09 (0.78 - 1.53)	0.61	88 (0.06%)	112 (0.08%)	1.30 (0.97 - 1.73)	0.08
Prosthetic Dislocation, n(%)	43 (0.03%)	52 (0.04%)	1.22 (0.81 - 1.84)	0.35	49 (0.03%)	69 (0.05%)	1.43 (0.98 - 2.07)	0.06
Mechanical Loosening, n(%)	43 (0.03%)	52 (0.04%)	1.22 (0.81 - 1.84)	0.35	49 (0.03%)	69 (0.05%)	1.43 (0.98 - 2.07)	0.06
Periprosthetic Fracture, n(%)	17 (0.01%)	16 (0.01%)	0.94 (0.47 - 1.87)	0.86	30 (0.02%)	30 (0.02%)	1.00 (0.60 - 1.67)	1.00
Prosthetic Fracture, n(%)	10 (0.01%)	10 (0.01%)	1.00 (0.42 - 2.41)	1.00	10 (0.01%)	12 (0.01%)	1.20 (0.52 - 2.79)	0.67
Postop Diagnosis Opioid Abuse/Dependence, n(%)	14 (0.01%)	34 (0.02%)	2.46 (1.32 - 4.61)	**0.004**	28 (0.02%)	46 (0.03%)	1.66 (1.03 - 2.68)	**0.03**
Mortality, n(%)	10 (0.01%)	10 (0.01%)	1.00 (0.42 - 2.41)	1.00	11 (0.01%)	20 (0.01%)	1.83 (0.87 - 3.83)	0.10
Revision, n(%)	42 (0.03%)	52 (0.04%)	1.25 (0.83 - 1.88)	**0.04**	57 (0.04%)	77 (0.05%)	1.37 (0.97 - 1.95)	0.08